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EXAMINER	
ARTMAN, THOMAS R	
ART UNIT	**PAPER NUMBER**
2882	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/824,225	RITTER, DIETER	
	Examiner	Art Unit	
	Thomas R. Artman	2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 June 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 August 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5 are rejected under 35 U.S.C. 102(b) as being anticipated by Alexandrescu (US 6,272,368 B1).

Regarding claim 1, Alexandrescu discloses an X-ray apparatus (Fig.5), including:

a) an examination subject 6 disposed between an x-ray source 3 and a radiation detector 2 in an x-ray imaging system (Fig.5), where the source and detector are mounted upon a carrier support 1,

b) an optical 3D sensor 11 for performing a distance measurement via active triangulation (col.3, lines 21-24), where the optical 3D sensor includes:

c) a light source 12 mounted to the carrier support 1 that emits a light line 15 that is detectable on a surface of the subject and an optical detector 13, mounted on the carrier support, that detects the light line on the surface of the subject and that emits a detector output dependent thereon, and

e) the carrier support is moved relative to the examination subject, and thus the light line, to acquire a series of 2D projections of the examination subject with the x-ray source and radiation detector and further to acquire a 3D image dataset with the optical 3D sensor,

representing a height above a 2D plane, from the distance measurement and the detector output of the optical detector, conforming to at least a portion of the surface of the examination subject (col.3, lines 9-35 and lines 54-61).

With respect to claims 2-5, Alexandrescu further discloses that the carrier support is a C-arm that is isocentrically arranged, where the supporting arrangement moves in both circumferencial and angular movements while acquiring the 3D image dataset of the patient surface (col.2, lines 44-61).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 6-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alexandrescu in view of Collins (US 6,535,574 B1).

Regarding claim 7, Alexandrescu discloses a method, including:

a) disposing an examination subject 6 disposed between an x-ray source 3 and a radiation detector 2 in an x-ray imaging system (Fig.5), where the source and detector are mounted upon a carrier support 1,

b) performing a distance measurement via active triangulation (col.3, lines 21-24) with an optical 3D sensor 11, where the optical 3D sensor includes:

c) a light source 12 mounted to the carrier support 1 that emits a light line 15 that is detectable on a surface of the subject and an optical detector 13, mounted on the carrier support, that detects the light line on the surface of the subject and that emits a detector output dependent thereon, and

e) moving the carrier support relative to the examination subject, and thus the light line, to acquire a series of 2D projections of the examination subject with the x-ray source and radiation detector and to acquire a 3D image dataset with the optical 3D sensor that represents a height above a 2D plane from the distance measurement and the detector output of the optical detector, conforming to at least a portion of the surface of the examination subject (col.3, lines 9-35 and lines 54-61).

Alexandrescu does not specifically disclose that the 3D image dataset acquisition occurs while the 2D projections are acquired.

However, Alexandrescu does state in col.3, lines 50-61, that the 3D image datasets are acquired while the C-arm is in motion. The skilled artisan readily recognizes that 2D x-ray projections can be acquired simultaneously with movement of the C-arm, depending upon the specific imaging mode being used.

Collins specifically teaches the practice of acquiring 3D image datasets with an optical 3D sensor simultaneously with 2D x-ray projections in order to save time and improve patient positioning reliability (col.4, lines 27-31; col.7, lines 21-47).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Alexandrescu to acquire the 3D image dataset and the 2D x-ray projections at the same time, as taught by Collins, in order to expedite the process and more accurately determine patient positioning.

With respect to claims 8-11, Alexandrescu further discloses that the carrier support is a C-arm that is isocentrically arranged, where the supporting arrangement moves in both circumferencial and angular movements while acquiring the 3D image dataset of the patient surface (col.2, lines 44-61).

With respect to claims 6 and 12, Alexandrescu does not specifically disclose a computer for calculating a volume dataset from the series of 2D projections, nor the additional practice of combining the 3D image dataset with the volume dataset by fusion or superimposition. The use of the 3D image dataset of the surface of the patient is limited to preventing collisions between the patient and the imaging system.

Collins teaches the practice of generating and combining an X-ray volume dataset, calculated from a series of 2D projections, with a 3D image dataset 944 of a surface of the patient that was imaged by the X-ray system (Figs.4, 5a; col.10, lines 6-52). In this way, the 3D image dataset is useful to provide accurate patient positioning information in order to perform repeat X-ray images at later times and to perform accurate radiation therapy (see at least Abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Alexandrescu to generate and combine an X-ray volume dataset with a 3D image dataset in order to improve patient positioning accuracy for future imaging or radiation therapy.

Response to Arguments

Applicants' arguments with respect to claims 1 and 7 have been fully considered but are not persuasive. Applicants assert that Alexandrescu does not use the C-arm movement specifically for the purpose of acquiring the 3D image dataset using the optical 3D sensor 11 mounted to the C-arm (Fig.5). Applicants further assert that the detector portion of the 3D sensor is not located on the C-arm, that the 3D sensor of Alexandrescu does not have surface data but only contains positional data, and further that Alexandrescu does not acquire X-ray projections and surface images at the same time. Finally, Applicants assert that the combination of Collins with Alexandrescu is not proper since no "true" 3D data is present in Alexandrescu.

The examiner respectfully disagrees on all points.

First, it is the examiner's position that, at least from col.3, lines 33-36 and lines 51-60, Alexandrescu makes it clear that the optical 3D sensor is performing the claimed acquisition of the 3D image dataset while the C-arm is moving; that is to say, the motion of the C-arm is happening simultaneously with the collection of the 3D image dataset. The optical 3D sensor is acquiring surface images while the C-arm is moving in order to detect potential collisions and avoid such situations (col.3, lines 49-60). As a result, the examiner concludes that the claim limitation is met.

Furthermore, the ability of the optical 3D sensor of Alexandrescu to acquire a 3D image dataset without movement of the C-arm, or the ability of the sensor to collect data at a separate, stationary position from the C-arm, does not preclude anticipation of the claimed invention. Alexandrescu specifically discloses that the positioning of the optical 3D sensor is immaterial insofar as the C-arm and patient remain within the field of view of the sensor (col.3, lines 7-17). Further still, the examiner notes that Applicants' deflection mirror is also capable of scanning the beam line and is not solely reliant upon the C-arm motion to perform the function.

Second, Alexandrescu specifically states that the sensor 11 is comprised of the light source 12 and detector 13 (col.3, lines 4-5). Therefore, Fig.5 depicts the optical 3D sensor, both source and detector, being mounted to the C-arm, as required by the claims.

Third, Alexandrescu states repeatedly that the 3D data acquired by the 3D sensor is surface data (col.3, lines 54-60). Therefore, the examiner is forced to conclude from the evidence of record that the data is not merely representative of a few positional 3D data points, but is in fact comprised of 3D images representing at least a portion of the surface of the patient, as required by the claims.

Fourth, the apparatus claim 1 does not require that the optical 3D images and 2D x-ray projections are acquired at the same time. The limitations in lines 18-25 of claim 1 are functional and merely require that the apparatus be capable of performing either acquisition function while the carrier support is being moved. Since it is the examiner's position that the

disclosure of Alexandrescu teaches both functionalities (as discussed above), then claim 1 is anticipated as such.

Applicants' arguments on this particular point, with respect to claim 7 as amended, are moot in view of the new grounds of rejection.

Finally, the examiner asserts that a combination of Alexandrescu and Collins is proper since both rely upon 3D image datasets that represent at least a portion of a surface of a patient that are acquired by optical 3D sensors for improved positioning, and therefore safety, of their respective x-ray imaging apparatus.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Aichinger (US 4,907,252) teaches optically scanning the surface of the patient in x-ray imaging procedures.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas R. Artman whose telephone number is (571) 272-2485. The examiner can normally be reached on 9am - 5:30pm Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Thomas R. Artman
Patent Examiner

EDWARD J. GLICK
SUPERVISORY PATENT EXAMINER